

PATENT SPECIFICATION



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232,521

(Patent of Addition to No. 225,931 : Oct. 19, 1923.)

Complete Accepted: April 23, 1925.

COMPLETE SPECIFICATION.

Improvements in Apparatus for Boring Wells and the like.

I, ALEXANDER IVANOVITCH MANCHO, a Russian citizen, of Soviet House, 49, Moorgate, London, E.C. 2, do hereby declare the nature of this invention (as communicated to me from abroad by Matvey Aleksovitch Capelushnicoff, a Russian citizen, of Baku, Caucasus, Russia), and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus for drilling bore holes, as in well-sinking, of the kind described and claimed in Patent Specification No. 225,931, in which water is supplied under pressure through a pipe or a series of connected pipes, which do not rotate, to a hollow drill head or chamber in which is mounted a hydraulic rotor or turbine driven by the said water supply and which, through gearing, drives a tubular stem carrying the cutting tool or bit, the water discharged from the turbine being by-passed directly from the rotor to the drilling bit without traversing the gear.

The present invention consists of a modification of or improvement in this kind of apparatus.

The principal feature of the present invention resides in the construction and arrangement of the casing which encloses the rotor spindle and transmission gear and around which the water or slush is by-passed from the rotor to the drilling bit, this casing being made detachable from the outer stationary piping and provided with means for definitely locating and securing it therein. Further, improved means are provided for preventing the access of slush from the outer piping to the interior of this casing and various other improvements are provided which will be hereinafter specifically described.

The invention is illustrated in longitudinal section in Figs. 1 and 2 of the accompanying drawings. The water or slush is pumped or otherwise forced down the stationary piping C which at its lower end is screwed into a hollow drill head D within which the rotary drill is mounted. In the upper end of this hollow drill head is a hydraulic rotor or turbine F which is driven by the water or slush forced into the bore hole. The rotor spindle F¹ is journaled at its upper end in ball bearings B fitted in a sleeve E which is screwed into an upward tubular extension of the stationary guide ring or nozzle F² of the rotor. Anti-friction thrust bearings B¹ are fitted between an internally projecting shoulder F³ of the stator ring F⁴ and the lower end of the sleeve E. A cap A screws into the upper end of the stationary guide ring to enclose the end of the rotor spindle and provide a reservoir for lubricant to which access is obtained through an aperture A¹ normally closed by a screwed plug, or fitted with an oil or grease cup.

The rotor F has a depending tubular sleeve or skirt F⁵ so shaped as to form a labyrinth with the walls of a stationary cap M which is connected, as by screwing, with the upper end of an internal tubular casing L provided to enclose the rotor spindle and transmission gear. This cap M is provided with a bush or bearing M¹ for the rotor shaft, and this bearing is furnished with lubricant from the reservoir within the cap A through an axial bore F⁶ in the upper part of the rotor shaft and a radial bore F⁷ leading therefrom to the bearing surface.

The tubular casing L is made separate and readily detachable from the stationary drill head D, being provided with longitudinal ribs L⁰ adapted to slide in longitudinal channels D⁰ in the interior of the drill head D which is provided with a depending tubular sleeve or skirt F⁵ so shaped as to form a labyrinth with the walls of a stationary cap M which is connected, as by screwing, with the upper end of an internal tubular casing L provided to enclose the rotor spindle and transmission gear. This cap M is provided with a bush or bearing M¹ for the rotor shaft, and this bearing is furnished with lubricant from the reservoir within the cap A through an axial bore F⁶ in the upper part of the rotor shaft and a radial bore F⁷ leading therefrom to the bearing surface.

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vided also on its interior with stops D¹ which determine the longitudinal position of the casing L in the drill head.

The drill socket member G is driven from the rotor shaft F¹ through an epicyclic chain of gears H, I¹, I², I³, J, of which the planet wheels I¹, I², I³ are carried on stub shafts which are screwed into a collar G¹ at the upper end of a shaft G⁰ of which the socket member G forms a rigid extension.

Upon rotation of the rotor F the planetary transmission gear will rotate the spindle G⁰, and consequently the drill, at a speed determined by the gear ratio and this speed can readily be varied, according to the character of the work to be done, by an interchange of the reduction gears.

Thrust bearings K, K are provided between an inwardly projecting shoulder L¹ on the casing L and the collar G¹ and the upper end G² of the drill socket, which latter part is provided with a bearing sleeve or bush G³ rotating within the lower end of the tubular casing L. Suitable clearances are provided in the various parts whereby the thrust bearings K and bush G³ are lubricated by oil escaping from the reduction gears.

The casing L terminates in a ring L² which fits within a shoulder N¹ on a cap or sleeve N which screws on to the lower end of the drill head D, and this sleeve has a ferrule or bush O of suitable material within which the drill socket G revolves. Setscrews P screwing into the sleeve N through holes in the bush O project into peripheral grooves on the exterior of the drill socket, without touching the latter, so as to prevent the socket from falling out should it be detached from the spindle G⁰.

The water or slush delivered through the piping C, after passing through the ring of stationary nozzles F² and the vanes of the rotor F, is by-passed directly to the tubular drill socket through the longitudinal channels L³ between the fixed casing L and the wall of the drill head, and thence through apertures L⁴ in the lower end of the tubular casing L and G⁴ in the tubular socket G.

Having now particularly described and

ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An apparatus for drilling bore holes of the kind herein specified, wherein the casing enclosing the power transmission gear between the rotor and the drilling spindle is detachable from the hollow drill head and is provided with means for definitely determining its position therein when assembled.

2. An apparatus according to Claim 1, wherein the enclosing casing is provided with longitudinal ribs engaging grooves in the drill head and the latter is provided with abutment stops, substantially as described.

3. An apparatus according to the preceding claims, wherein the upper end of the enclosing casing is provided with a cap which is formed to constitute a labyrinth in conjunction with a sleeve or skirt depending from the rotor or turbine wheel, substantially as described.

4. An apparatus according to the preceding claims, wherein thrust bearings to take the end thrust on the rotor spindle are interposed between the upper part of the said spindle and the fixed nozzle ring or stator of the turbine, substantially as described.

5. An apparatus according to Claim 4, wherein an upward tubular extension of the fixed nozzle ring or stator is provided with a cap which encloses the upper part of the rotor spindle and constitutes a lubricant reservoir, substantially as described.

6. An apparatus according to Claim 5, wherein the said reservoir is connected by ducts in the rotor spindle with an intermediate bearing surface of an intermediate bearing of the rotor spindle, substantially as described.

7. An apparatus for drilling bore holes constructed substantially as herein described and illustrated.

Dated this 10th day of December, 1924.

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2nd Edition

[This Drawing is a reproduction of the Original on a reduced scale.]

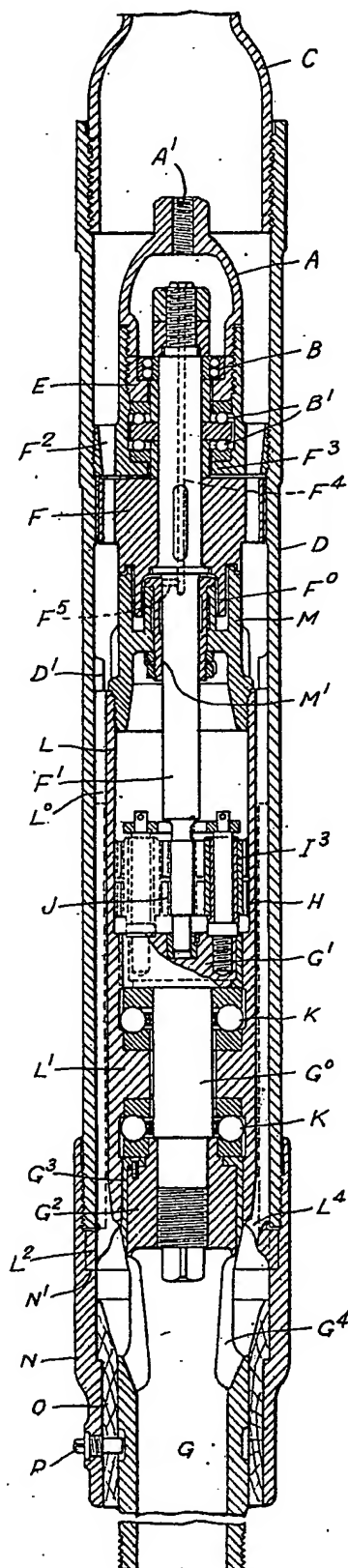


FIG. 1.

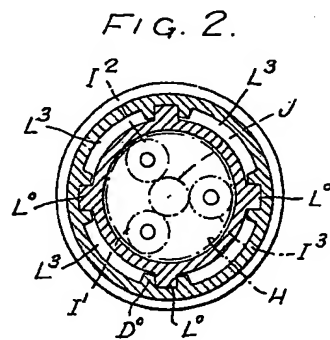


FIG. 2.

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